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The Mojave Desert as Grounds for Change: Clarifying Property Rights in California's Groundwater to Make Extraction Sustainable Statewide

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Because most available surface water sources have already been exploited, Californians have increasingly relied upon groundwater and are pressuring policymakers to devise creative solutions using groundwater to meet the thirsty state's demand for water. However, many groundwater basins in California have already been severely overdrafted. California's groundwater depletion problem is two-fold: one of both supply and demand. First, groundwater is often extracted at the cost of long-term basin sustainability. Second, groundwater demand reflects wasteful consumption habits by Californians. Although inflated water demand is a serious issue, this paper seeks to address only problems of groundwater supply.

California law governing the state's 450 known groundwater basins does not adequately recognize the scientific complexity of groundwater that gives it persistent commons' attributes.[1] In some situations, a commons' tragedy can be avoided by imposition of a private property system. However, because the common law-based private property system in groundwater remains plagued by uncertainty, this precious natural resource is now partially depleted and contaminated. Moreover, the California legislature has basically ignored the needs of its groundwater basins.[2]

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1. For an explanation of the "tragedy of the commons," *see infra* Part II.A.

2. California's new water planning legislation, Senate Bill 221, Senate Bill 610 and Assembly Bill 901, do not begin to resolve the state water shortage. While legislators should be commended for attempting to add a layer of accountability to urban water use supply with this recent legislation, they unfortunately get no closer to a long-term solution. Each bill essentially requires that large-scale project developers locate a water supply for future inhabitants. This legislation addresses neither the problem of supply nor of demand, instead putting the onus improperly on the middleman, the water agency. There is still no incentive

Recent events concerning the Mojave Desert highlight the dire need for groundwater rights clarification. First, the California Supreme Court rejected a trial court's physical solution[3] to bind parties claiming ambiguous rights to extract groundwater.[4] Water extraction continues unchecked by basin users who have opted out of the stipulated judgment. Second, the Metropolitan Water District ("MWD") has seriously considered partnering with Cadiz, Inc. ("Cadiz") on a conjunctive use and water marketing project to exploit the aquifer beneath Cadiz's property.[5] Much of the land overlying the aquifer system is treasured national park and wilderness set aside to protect rare and endangered plant and animal species. Cadiz proposes to artificially add and remove water from the aquifer, jeopardizing the natural balance of the neighboring desert ecosystem in the process. To prevent overdrafting this groundwater basin and others, usufructuary rights must be clarified before anyone initiates projects of this sort.

Only a statewide approach can address the hydrologic system of surface and groundwater flows that interchange above and below the ground irrespective of municipal and county boundaries. Since the common law cannot resolve the crisis, the legislature must speak through statute. But because claims are highly individualized, a catered, quasi-judicial solution is also necessary. The California legislature should require the adjudication of rights in each basin. The statute must detail central recordkeeping and enforcement mechanisms to assure that groundwater allocation rights are respected. Although this proposal will not entirely resolve the water supply crisis, it will stabilize groundwater resources, which constitute 30% of the state's applied water source.[6]

Part I of this paper describes groundwater resources in California, as well as the science and state law governing groundwater. Part II argues that groundwater supply problems, namely overdraft, can only be solved by state legislation mandating adjudication of all claims to water use in California's groundwater basins.[7] Part III proposes a statewide system for adjudication and comprehensive groundwater management.

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for individuals to reduce consumption and no incentive for pumpers to reduce overdrafting. Instead, there is more incentive to pressure water agencies to provide more water.

3. A "physical solution" is an arrangement between parties "fashioned when the strict application of water rights in a case will result in waste and some other appropriation of water would protect vested rights and prevent waste." JEFFREY S. ASHLEY AND ZACHARY A. SMITH, GROUNDWATER MANAGEMENT IN THE WEST 45 (University of Nebraska Press 1999).

4. City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224 (2000).

5. *See infra* Part II.A.

6. CALIFORNIA DEPARTMENT OF WATER RESOURCES, CALIFORNIA WATER PLAN UPDATE BULLETIN 160-98, ES3-5 (1998), *available at* http://rubicon.water.ca.gov/b160index.html.

7. Rights to water in fifteen basins have been adjudicated under our common law system. *See infra* note 102.

Part I

A. Water in California, Where Supply Can't Meet Demand

Californians already demand more water than is available. Average annual water use in 1995 was 79.5 million acre-feet ("maf"),[8] a level of demand that exceeded supply by 1.6 maf.[9] Urban, agricultural, and environmental users procured water from the following sources: 65.1 maf from surface water, 12.5 maf from groundwater, and 0.3 maf from recycling and desalinization processes.[10] Groundwater supplies about 30% of the state's urban and agrarian water needs.[11]

The California Department of Water Resources ("Department") recognizes that many groundwater basins are already overdrafted, but believes that statewide groundwater overdraft will not increase by 2020. By 1980, the Department had already identified 42 overdrafted groundwater basins.[12] About 1.5 maf/year were overdrafted by 1995.[13] The Department expects overdraft to decline to 1.1 maf/year by 2020[14] even though the state's population will likely increase by 15 million people over the same period, with an estimated demand of an additional 3.2 maf of water each year.[15] The Department projects that increased demand will be met, in part, by extracting an additional 165,000 acre-feet of groundwater, presumably from basins that can spare the water and still maintain a safe yield.[16]

Pressure to extract more water from aquifers will also increase because California must find a substitute source for almost 800,000 acre-feet/year of Colorado River water. California has historically diverted as much as 5.2 maf from

8. To visualize one acre-foot of water, imagine one acre of land covered by one foot of water. One acre-foot is approximately 326,000 gallons. According to 1995 average water demand projections, urban uses demanded 8.8 maf, agriculture required 33.8 maf, and environmental uses required 36.9 maf. CALIFORNIA DEPARTMENT OF WATER RESOURCES, *supra* note 6, at ES5-2 (Table ES5-1).

9. *Id.*

10. *Id.*

11. GOVERNOR'S ADVISORY DROUGHT PLANNING PANEL, CRITICAL WATER SHORTAGE CONTINGENCY PLAN 1-4 (December 29, 2000).

12. ASHLEY & SMITH, *supra* note 3, at 39.

13. CALIFORNIA DEPARTMENT OF WATER RESOURCES, *supra* note 6, at ES3-7 (Table ES3-2).

14. *Id.*

15. *Id.* at ES5-3.

16. CALIFORNIA DEPARTMENT OF WATER RESOURCES, *supra* note 6, at ES3-5 (Table ES3-1) and ES3-7 (Table ES3-2). Overdraft occurs when the amount of groundwater extracted from the aquifer is greater than the amount of water replenishing the aquifer. DAVID H. GETCHES, WATER LAW IN A NUTSHELL 239 (West Publishing Co. 1997). Overdraft is measured as a long-term trend, and should not reflect the annual difference between extraction and recharge from natural fluctuations between drought and flood years. CALIFORNIA DEPARTMENT OF WATER RESOURCES, *supra* note 6, at ES3-5. Negative effects of overdrafting are discussed *infra* Part I.C.

the Colorado River annually,[17] although technically entitled to only 4.4 maf under the Boulder Canyon Project Act, according to the Supreme Court in *Arizona v. California*.[18] Pursuant to the Colorado River Interim Surplus Guidelines issued January 25, 2001, California has until 2015 to reduce its diversions from 5.2 maf to 4.4 maf.[19] The Department expects that void will be filled with surface water from the Central Valley Project and State Water Project, in addition to increased extraction from groundwater basins.[20] There are 450 known groundwater basins in California containing up to 850 million acre-feet of water.[21] Despite increased reliance on this resource, the state does not regulate groundwater extraction.

B. The Science of Groundwater

The California Water Code defines groundwater as "all water beneath the surface of the earth within the zone below the water table in which the soil is completely saturated with water, but does not include water which flows in known and definite channels."[22] The law distinguishes percolating water from that which flows in underground streams,[23] but water moving beneath the surface is more complicated than the law suggests.

In the natural hydrologic cycle, "some of [the] water that falls to the earth's surface will seep into the ground and be pulled downward by gravity until it reaches a depth where the subsurface is saturated with water."[24] This level is the water table, and groundwater flows beneath it.[25] Groundwater moves within the geologic formation beneath the water table, in both confined and unconfined

17. GOVERNOR'S ADVISORY DROUGHT PLANNING PANEL, *supra* note 11, at 2-4.

18. Arizona v. California, 373 U.S. 546, 565, 580 (1963) (The Act devised a numeric allocation, but permitted Arizona, California and Nevada, the Lower Basin states, to select different terms if agreed upon by state compact.).

19. *See* Department of the Interior, Record of Decision: Colorado River Interim Surplus Guidelines, Final Environmental Impact Statement, 66 Fed. Reg. 7,772-7,782 (2001).

20. CALIFORNIA DEPARTMENT OF WATER RESOURCES, *supra* note 6, at ES5-2.

21. ARTHUR L. LITTLEWORTH & ERIC L. GARNER, CALIFORNIA WATER 2 (1995); State Water Resources Control Board, *Ground Water in California* 2 *at* www.swrcb.ca.gov/general/publications/docs/ground-water.pdf (last visited May 6, 2002).

22. CAL. WATER CODE § 10752(a) (Deering 2001).

23. Los Angeles v. Pomeroy, 124 Cal. 597, 617-18 (1899); Vineland Irrigation Dist. v. Azusa Irrigating Co., 126 Cal. 486, 494 (1899) ("It is essential to the nature of percolating waters that they do not form part of the body or flow, surface or subterranean, of any stream. They may either be rain waters which are slowly infiltrating through the soil, or they may be waters seeping through the banks or bed of a stream which have so far left the bed and the other waters as to have lost their character as part of the flow.")

24. Erik Swenson, *Public Trust Doctrine and Groundwater Rights*, 53 U. MIAMI L. REV. 363, 372 (1999).

25. *Id.*

aquifers.[26] In a confined aquifer, water is under pressure because it is overlaid by impermeable rock or clay through which it cannot pass.[27] In contrast, water in an unconfined aquifer can move from the water table to the base of the aquifer because there is no impermeable geologic material to thwart its passage.[28]

Aquifers are often hydrologically connected to each other and to surface water.[29] The locational flow of water will vary depending on the water level in each system.[30] Water will percolate from a system of higher elevation down to the base water table level.[31] Groundwater moves slower than surface water because groundwater is usually traveling through the pores of geologic formations.[32] There is immense variation in porosity between and within geologic formations. Higher porosity means that more water can be stored in the rock.[33] Permeability corresponds to the size of pores and describes "the ease through which water flows through a geologic formation."[34] There are comparatively large gaps through which the water can pass in sand and gravel so it is characterized as having high porosity and high permeability.[35]

C. Groundwater Quality and Quantity in California Today

The percolation process normally filters out contaminants in water as it moves through the strata of geologic formations. However, groundwater will transport certain types of contaminants in soil saturated with chemicals. As a result, a number of California aquifers are contaminated by pesticides and other agricultural by-products.[36] Some have been degraded by salt water intrusion and others by industrial chemicals. As a result, the quality of the groundwater depends not only on the quality of water percolating from the surface, but also on what is already deposited in the sediments through which the water passes.[37]

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26. *Id.*

27. *Id.* n.78 (citing C.W. FETTER, APPLIED HYDROGEOLOGY 5, 101-02 (2d ed. 1988)); Ella Foley-Gannon, *Institutional Arrangements for Conjunctive Water Management in California and Analysis of Legal Reform Alternatives*, 6 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 273, 279 (2000).

28. Swenson, *supra* note 24, at 372 n.78.

29. Foley-Gannon, *supra* note 27.

30. *Id.*

31. *Id.*

32. Swenson, *supra* note 24, at 372.

33. *Id.* at 373.

34. *Id.*

35. Foley-Gannon, *supra* note 27.

36. Jodie T. Raccio, *Agricultural Use of Pesticides: Farmer and Manufacturer Liability for Groundwater Contamination*, 3 ALB. L.J. SCI. & TECH. 185, 187 (1993) (citing PATRICK W. HOLDEN,. PESTICIDES AND GROUNDWATER QUALITY—ISSUES AND PROBLEMS IN FOUR STATES 4 (1986)).

37. Foley-Gannon, *supra* note 27, at 280.

As mentioned in the first section, at least forty-two of California's groundwater basins are already overdrafted.[38] There are many negative consequences of overdrafting an aquifer. First, because the water table drops, extractors must dig deeper wells and pumping becomes more expensive.[39] Second, when an aquifer is overdrawn for an extended period, the water-bearing geologic formations are compacted. The land is pulled downward, causing subsidence at the surface.[40] One area of the Santa Clara Valley subsided 28 feet between 1933 and 1967[41] and some parts of the San Joaquin Valley have subsided 30 feet because of groundwater overdrafting.[42] Third, vegetation above an overdrafted aquifer is likely to die as the surface is "desertified." [43] Finally, salt-water intrusion irreversibly contaminates aquifers near the coast.[44]

D. California's Groundwater Law

Responsibility for groundwater protection has been left to the individual states.[45] In California, the right to use groundwater is a real property right.[46] The

38. ASHLEY & SMITH, *supra* note 3, at 39.

39. *See* Gregory S. Weber, *Twenty Years of Local Groundwater Export Legislation in California: Lessons from a Patchwork Quilt*, 34 NAT. RESOURCES J. 657, 660 (1994); Benjamin R. Vance, *Comment, Total Aquifer Management: A New Approach to Groundwater Protection*, 30 U.S.F. L. REV. 803, 804-805 (1996); GETCHES, *supra* note 16, at 246 (describing the increased costs of extracting water from greater depths); Susan Batty Peterson, *Designation and Protection of Critical Groundwater Areas*, 1991 BYU L. Rev 1393, 1398 (1991); Barton H. Thompson, Jr., *Water Allocation and Protection: A United States Case Study*, EARTH SYSTEMS: PROCESSES AND ISSUES 476, 488-489 (W.G. Ernst ed., 2000); Sandra Postel, *When the World's Wells Run Dry*, WORLD WATCH 30, 33 (Sept.-Oct. 1999) (describing how increased pumping costs has driven some groundwater users to abandon pumping.).

40. Peterson, *supra* note 39, at 1395; Thompson, *supra* note 39, at 489.

41. Christopher B Amandes, *Controlling Land Surface Subsidence. A Proposal for a Market Based Regulatory Scheme*, 31 UCLA L. REV. 1208, 1213 (1984).

42. State Water Resources Control Board, *supra* note 21; ASHLEY & SMITH, *supra* note 3, at 40; TERRY L. ANDERSON, WATER CRISIS: ENDING THE POLICY DROUGHT 99 (The Johns Hopkins University Press 1983).

43. Thompson, *supra* note 39, at 489; Deborah Moore and Zach Willey, *Water in the American West: Institutional Evolution and Environmental Restoration in the 21st Century*, 62 U COLO. L. REV. 775, 776-780 (1991) (describing the environmental drought generally, without distinguishing groundwater from surface water depletion).

44. ASHLEY & SMITH, *supra* note 3, at 40; Peterson, *supra* note 39, at 1397; Thompson, *supra* note 39, at 489.

45. UNITED STATES GENERAL ACCOUNTING OFFICE, WATER POLLUTION: MORE EMPHASIS NEEDED ON PREVENTION IN EPA'S EFFORTS TO PROTECT GROUNDWATER 13 (1991) (stating that "[b]oth EPA and the states agree that the primary responsibility for protecting groundwater belongs to the states").

state law pertaining to groundwater rights has largely developed through common law, but the California Constitution and the California Water Code also provide some limited directives.

1. Judge-Made Law

When California became a state in 1850, the California legislature adopted English common law and repealed all laws of Spanish and Mexican origin governing the land except those stipulated in the Treaty of Guadalupe-Hidalgo.[47] Among the few rights they preserved were *Pueblo water rights*, which are the rights of a municipal successor to a Spanish/Mexican pueblo to reasonable and beneficial use of the water underlying the historic pueblo.[48] Apart from Pueblo rights, California courts followed English common law to adjudicate water disputes.[49] As such, courts initially applied the *absolute ownership rule*, giving landowners the right to unlimited extraction of water beneath their land regardless of negative impacts on neighboring groundwater users.[50] The landowner's right to pump the water beneath her land is called an *overlying right*.[51]

In the 1903 case of *Katz v. Walkinshaw*, the California Supreme Court abandoned the doctrine of absolute ownership and imposed the *correlative rights*

46. Note that this is a usufructuary right, which means it is a right to *use* water, not an ownership right in groundwater per se. ERIN SCHILLER & ELIZABETH FOWLER, ENDING CALIFORNIA'S WATER CRISIS 33 (Pacific Research Institute 1999).

47. Mark T. Kanazawa, *Efficiency in Western Water Law: The Development of The California Doctrine*, 1850-1911, 27 J. LEGAL STUD. 159, 162 (1998).

48. SCOTT S. SLATER, CALIFORNIA WATER LAW AND POLICY, Vol. 1, 5-3 (Butterworth Legal Publishers 2001); *see also* Kevin L. Patrick & Kelly E. Archer, A *Comparison of State Groundwater Laws*, 30 TULSA L.J. 123, 140 n.143 (1994) (for a description of their origin and cases addressing Pueblo rights).

49. English common law distinguishes surface water from groundwater. For surface water disputes, courts applied the riparian principle that landowners who lived adjacent to surface water are entitled to use it, and their rights are derived from their use of the water. Kanazawa, *supra* note 47, at 163. The right "is usufructuary, and consists not so much of the fluid itself as the advantage of its use." *Id.* Courts later adopted a "no-injury" rule. The California Supreme Court explained that, "[a] riparian proprietor, while he has the undoubted right to use the water flowing over his land, must use it as to do the least possible harm to other riparian proprietors." *Id.* at 164 (quoting Crandall v. Woods, 8 Cal. 136, 141 (1857)). Then California courts recognized a right of prior appropriation to surface water. Mark Kanazawa argues that courts created prior appropriation rights to address gold miners' needs to divert and use non-riparian water in California. *Id.* at 165. Subsequently the court grappled with employing a riparian and appropriation system simultaneously for surface water, giving riparian owners priority and the right to transfer their interests to appropriators. *Id.* at 168-172.

50. 62 Cal. Jur. 3d § 394 (1981).

51. City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224 (2000) ("[A]n overlying right ... is the owner's right to take water from the ground underneath for use on his land within the basin or watershed; the right is based on ownership of land and is appurtenant thereto.") (*quoting* California Water Service Co. v. Edward Sidebotham & Son, 224 Cal. App. 2d 715, 725 (1964)).

doctrine.[52] Under this rule, overlying users hold in common the right to use the groundwater for reasonable and beneficial use of the aquifer's safe yield.[53] All overlying landowners hold this right, irrespective of whether they withdraw groundwater.[54] Extracting up to the safe yield means removing only as much water as will be recharged into the aquifer.[55] If users withdraw more water than the safe yield, then all overlying users must reduce their use to a fair and just proportion relative to the other overlying users.[56] When there is surplus water, it may be appropriated by others who do not have overlying rights.[57]

Besides Pueblo and overlying rights, the courts recognize two other types of rights in groundwater usage. An *appropriation right* is the right to extract groundwater surplus to that needed by overlying users and transport it to land that does not overlie the groundwater basin from which it was extracted.[58] To get appropriation rights, one merely withdraws the surplus water and puts it to beneficial use.[59] A *prescriptive right* is gained by pumping continuously for the prescription period when prior rights-holders have notice and there is no surplus water in the basin.[60]

There are priorities between and among the rightholders. Pueblo rights trump all other claims of use.[61] The other three are prioritized as follows:

> [B]etween overlying users, no temporal priority exists. Rather, in times of shortage, each is entitled to a reasonable share of the common supply. As between appropriators, temporal priority exists; the rights of a pumper first in time are senior to those of a later appropriator. As between overlying users and appropriators, overlying users have priority, regardless of the date of the inception of the overlying use. Prescriptive rights-holders can quantify their rights as against both prior appropriators and overlying owners under formulas developed by the courts.[62]

52. LITTLEWORTH & GARNER, *supra* note 21, at 49.

53. Katz v. Walkinshaw, 141 Cal. 116, 144 (1903).

54. ASHLEY & SMITH, *supra* note 3, at 45.

55. ANNE SCHNEIDER, GROUNDWATER RIGHTS IN CALIFORNIA 99 (Governor's Comm'n to Review Cal. Water Rights Law, Staff Paper No. 2. 1977).

56. *Katz*, 141 Cal. at 134-36; ANDERSON, *supra* note 42, at 97; 62 Cal. Jur. 3d § 401 (1981).

57. *Katz*, 141 Cal. at 135-36.

58. Foley-Gannon, *supra* note 27, at 285.

59. SCHILLER & FOWLER, *supra* note 46, at 7-8.

60. To gain a prescriptive right, use must be (1) reasonable and beneficial, (2) open and notorious, (3) hostile and adverse, (4) continuous and uninterrupted for five years, and (5) exclusive and under a claim of right. City of Los Angeles v. San Fernando, 14 Cal. 3d 199, 281-82 (1975).

61. SLATER, *supra* note 48, at 5-3.

62. Gregory S. Weber, *Forging A More Coherent Groundwater Policy in California: State and Federal Constitutional Law Challenges to Local Groundwater Export Restrictions*, 34 SANTA CLARA L. REV. 373, 375-76 (1994).

In sum, the appropriator's use is limited to the amount of the surplus water in the groundwater basin. If there is no surplus water, the appropriator is not entitled to take any water, unless he has acquired prescriptive rights.[63]

Three key cases have further defined groundwater law in California. The first arose after the Raymond Basin was overdrafted for more than twenty years. In *Pasadena v. Alhambra*, the California Supreme Court imposed use limits to reduce extraction to the basin's safe yield.[64] Rather than ascertain the overlying and appropriative rights of each party, the Court reasoned that because the basin had been overdrafted for so many years, all parties had developed mutually prescriptive rights against all others and each must reduce their use proportionate to the quantity they had acquired by prescription.[65] The Court determined the prescriptive quantity by looking at each pumper's annual average extraction for the five years preceding the lawsuit.

After *Pasadena v. Alhambra* was decided in 1949, the mutual prescription doctrine[66] facilitated negotiations because parties could calculate individual extraction formulations based on recent use that became binding when incorporated into the Court's judgment instead of grappling over figures based on abstract overlying and appropriation rights.[67] As one commentator noted, "[b]y agreeing to apply a formula, the parties have avoided adversary proceedings in many situations where determination of complex appropriative priorities might in any event be impossible because of the insufficient and unreliable data."[68]

Mutual prescription's utility declined, however, after *City of Los Angeles v. City of San Fernando*. The California Supreme Court announced that the notice requirement of prescriptive rights is not met simply by the lowering of the water table, despite the *Alhambra* Court's finding that a lowered water table provides notice because it is overdraft.[69] The *San Fernando* Court redefined overdraft to be long term decline of the

63. City of Pasadena v. City of Alhambra, 33 Cal. 2d 908, 926-27 (1949).

64. *Id.* at 929.

65. *Id.* at 928-933.

66. The mutual prescription doctrine is the concept developed by the *Pasadena* Court that all basin extractors can simultaneously establish prescriptive rights against one another when a basin is overdrafted through the prescriptive statutory period because all pumpers have extracted water contrary to the preexisting rights of one another for that period. Once extractors' rights are perceived as mutually prescriptive, courts may determine individual extraction limits by looking at each extractor's historical use during the prescriptive period. GETCHES, *supra* note 16, at 250.

67. SCHNEIDER, *supra* note 55, at 23-24.

68. ASHLEY & SMITH, *supra* note 3, at 46-47 (*quoting* MARYBELLE D. ARCHIBALD, APPROPRIATIVE WATER RIGHTS IN CALIFORNIA 23-24 (Governor's Comm'n to Review California Water Rights Law 1977).

69. *San Fernando*, 14 Cal. 3d at 282. ("The commencement of overdraft provides the element of adversity which makes the first party's taking an invasion constituting a basis for injunctive relief to the other party. But if the other party is not on *notice* that the overdraft exists, such adverse taking does not cause the commencement of the prescriptive period.").

water table, excluding natural fluctuations.[70] The court also declared that prescriptive rights cannot be gained against public entities.[71] So mutual prescription does not exist when a public entity is party to an adjudication.[72]

The *San Fernando* Court also critiqued the equitable apportionment remedy lower courts often employed after finding mutual prescription. The Court said, "[a] true equitable apportionment would take into account many more factors."[73] In footnote 61, the Court noted that the United States Supreme Court equitably apportioned water in *Nebraska v. Wyoming*, and further stated:

> [a]pportionment calls for the exercise of an informed judgment on a consideration of many factors. Priority of appropriation is the guiding principle. But physical and climatic conditions, the consumptive use of water in the several sections of the river, the character and rate of return flows, the extent of established uses, the availability of storage water, the practical effect of wasteful uses on downstream areas, the damage to upstream areas as compared to the benefits to downstream areas if a limitation is imposed on the former—these are all relevant factors. They are merely an illustrative, not an exhaustive catalogue.[74]

The *San Fernando* Court's emphasis on ordering priorities when determining equitable apportionment suggests that even when all parties to the action are private individuals, a court cannot get around characterizing priorities by finding mutual prescription.

The California Supreme Court reaffirmed the groundwater priority rights system in *City of Barstow v. Mojave Water Agency*,[75] unanimously holding that "although it is clear that a trial court may impose a physical solution to achieve a practical allocation of water to competing interests, the solution's general purpose cannot simply ignore the priority rights of the parties asserting them."[76] The court further directed that "a court may neither change priorities among the water rights holders nor eliminate vested rights in applying the solution without first considering them in relation to the reasonable use doctrine."[77] In *City of Barstow*, the trial court had enforced a physical solution that set an annual production limit for each party based on prior use with no

70. *Id.* at 280.

71. *Id.* at 270-77 (interpreting a 1968 amendment to California Civil Code § 1007 to create a broad prohibition on obtaining prescription against water that is, in the words of the statute, "dedicated to a public use.").

72. SCHNEIDER, *supra* note 55, at 31-32.

73. *San Fernando*, 14 Cal. 3d at 265.

74. *Id.* at 265 n.61.

75. City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224 (2000).

76. *Id.* at 1250.

77. *Id.* at 1237.

consideration for preexisting legal water rights.[78] The trial court reasoned that "the doctrine of reasonable and beneficial use, as established by Article X, Section 2 of the California Constitution, required an equitable apportionment of all rights when a basin is in overdraft."[79] The Supreme Court disagreed, insisting that "[c]ase law simply does not support applying an equitable apportionment to water use claims unless all claimants have correlative rights; for example, when parties establish mutual prescription."[80] The California Supreme Court upheld the appellate court's disposition that parties may stipulate to a physical solution not based on their legal priorities if they agree to waive their existing water rights,[81] but the rights of non-stipulating parties are not affected by the stipulated judgment.[82] Prior use may still be a common method of resolving disputes if parties stipulate to using it, but *City of Barstow* may slow pre-judgment negotiation of water rights because parties will not be bound to commit to a physical solution based on prior use unless mutual prescription has been established.[83]

2. California Statute-Based Law

In response to real and threatened depletion of water sources, the California Constitution was amended in 1928 by citizen initiative.[84] Article X, Section 2 declares that "[t]he right to water or to the use or flow of water in or from any natural stream or water course in this state is and shall be limited to such water as shall be reasonably required for the beneficial use to be served, and such right does and shall not extend to the waste or unreasonable method of diversion." The amendment reinforces the correlative rights doctrine's reasonable and beneficial use requirement.[85]

78. *Id.* at 1235-36.

79. *Id.* at 1238.

80. *Id.* at 1248.

81. *Id.* at 1256 n.17.

82. *Id.* at 1253, 1256 (The California Supreme Court affirmed the appellate court decision that the physical solution may bind stipulating parties, but the Cardozo appellants, a non-stipulating party, still have their overlying rights protected.).

83. After this decision, a trial court may impose a physical solution based on prior use instead of legal priorities, so long as it first finds that mutual prescription exists. After *San Fernando*, in order to find mutual prescription, the basin must be suffering from overdraft for at least five consecutive years with notice to users and a public agency has not reserved a legal priority in the basin.

84. ASHLEY & SMITH, *supra* note 3, at 45. The amendment was inspired by concerns for surface water, but the California Supreme Court later held that it also applied to groundwater. *See, e.g.*, Peabody v. City of Vallejo, 2 Cal. 2d. 351, 367 (1935).

85. SCHNEIDER, *supra* note 55, at 77-78. Judicial determinations of what is reasonable and beneficial use varies. Whether or not a court restricts use may depend on the perceived scarcity of water at the time of the suit. Tulare Irrigation Dist. v. Lindsay-Strathmore Irrigation Dist., 3 Cal. 2d 489, 567 (1935). Some courts give great weight to the "ever increasing need for the conservation of water in this state, an inescapable reality of life quite

The California legislature has not yet defined property rights in groundwater use. There is very little state law governing groundwater.[86] California Water Code Section 2100 authorizes the State Water Resources Control Board ("SWRCB") to police the use of water in the state, but does not require it.[87] The Water Code also gives the SWRCB power to referee adjudication of groundwater rights and investigate matters pertaining to adjudication of rights upon a court's request.[88] In *Imperial Irrigation District v. State Water Resources Control Bd.*, a California Appellate Court found that SWRCB may declare standards of reasonable use.[89]

The legislature has also established groundwater extraction monitoring requirements, but they only apply to four counties in the state.[90] Individuals who extract more than twenty-five acre-feet of water each year from any basin in Riverside, San Bernardino, Los Angeles, or Ventura County must file a "Notice of Extraction and Diversion of Water" with the SWRCB.[91] If an extractor does not file a notice of her location and quantity of pumping, her use is not recognized under the law.[92]

The legislature has passed many bills to facilitate local groundwater management. For example, the California Water Code includes a number of special district acts. Each act creates a specific geographic groundwater management district with enumerated functions.[93] The legislature authorizes special districts to perform an array of functions, such as determining groundwater capacity, managing flow in and out of its basins, setting quotas for use when the basins are overdrafted, and prosecuting unreasonable users.[94] The legislature has also authorized various types of water districts (agencies), which may levy taxes, issue bonds, set service rates, and participate in litigation

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apart from its express recognition in the 1928 amendment." Joslin v. Marin Mun. Water Dist., 67 Cal. 2d. 132, 140 (1967).

86. There are a few state statutes addressing groundwater contamination, but they will not be addressed here as groundwater quality is beyond the scope of this paper.

87. The SWRCB can initiate a basin adjudication to prevent destruction or irreparable injury to groundwater quality. CAL. WATER CODE § 2100 (Deering 2001).

88. CAL. WATER CODE § 2000 (Deering 2001).

89. 225 Cal. App. 3d 548, 561 (1990).

90. *See* CAL. WATER CODE § 4999-5008 (Deering 2001).

91. *Id.* at §§ 4999, 5001.

92. *Id.* at § 5004. The statute imposes no other penalties, except that under § 5003 the extractor cannot gain a prescription right against others.

93. *See, e.g.*, CAL. WATER CODE App. §§ 118-101 to 118-901 established the Monterey Peninsula Water Management District in Monterey County. For a list of other specific districts, *see* Eric L. Garner, Michelle Ouellette, and Richard L. Sharff, Jr., *Institutional Reforms in California Groundwater Law*, 25 PAC. L.J. 1021, 1033 n.114 (1994).

94. Foley-Gannon, supra note 27, at 291-293.

affecting users in their jurisdiction.[95] Assembly Bill 3030 grants these local agencies the right to adopt groundwater management plans, but not the right to make binding determinations of individuals' water rights.[96] Approximately 150 agencies have adopted groundwater management plans pursuant to AB 3030.[97]

Cities and counties may use their police power to regulate groundwater by ordinance as long as there is no conflict with state law.[98] About 30% of California's counties adopted groundwater ordinances, usually requiring a conditional use permit before water can be exported from the county of origin.[99]

E. Groundwater Basin Adjudication in Practice

Competing rights for groundwater are generally not adjudicated until after a groundwater basin becomes overdrafted. A senior appropriator or overlying right-holder typically brings an action against a junior appropriator, seeking an injunction to halt the junior appropriator's use. To set the order of priority, the court must then characterize each extractor's use. "One product of the adjudication is judicial determination of the nature and quantity of each groundwater user's share of the basin's safe yield."[100]

After rights are adjudicated, the court typically appoints a watermaster, who then manages the quantity of water in the basin. The court may give the watermaster authority to devise methods to prevent overdraft, and the watermaster may petition to have other responsibilities, such as oversight of water quality. The court usually reserves the right to review its order when conditions change.[101] Sixteen groundwater basins in California have been adjudicated.[102]

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95. ASHLEY & SMITH, *supra* note 3, at 43; Barton H. Thompson, Jr., *Institutional Perspectives on Water Policy and Markets*, 81 CAL. L. REV. 673, 697 n.80 (1993) (providing a list of sources that discuss success of these districts); *see also* CALIFORNIA DEPARTMENT OF WATER RESOURCES BULLETIN NO. 155-94, GENERAL COMPARISON OF CALIFORNIA WATER DISTRICT ACTS (1994) (list of all general and special districts created by the California legislature).

96. *See* CAL. WATER CODE § 10750-10755.4 (West 2001) (for terms of groundwater management plans); *see also* Garner, Ouellette, and Sharff, *supra* note 93, at 1032. Section 10753.8(b) does not authorize agencies to make binding determinations of individual users' rights.

97. GOVERNOR'S ADVISORY DROUGHT PLANNING PANEL, *supra* note 11, at 2-7; *see also* CALIFORNIA DEPARTMENT OF WATER RESOURCES, GROUNDWATER MANAGEMENT IN CALIFORNIA: A REPORT TO THE LEGISLATURE 9-11 (1999).

98. Baldwin v. County of Tehama, 31 Cal. App. 4th 166, 175 (1994).

99. GOVERNOR'S ADVISORY DROUGHT PLANNING PANEL, *supra* note 11, at 2-7.

100. Foley-Gannon, *supra* note 27, at 286.

101. *Id.* at 289.

102. In order of final court adjudication, these basins are: 1944 Raymond Basin, 1958 Cucamonga Basin, 1961 West Coast Basin; 1965 Central Basin; 1966 Santa Margarita River Watershed; 1969 San Bernardino Basin; 1972 Cummings Basin; 1973 Tehachapi Basin; 1973 Main San Gabriel Basin; 1977 Warren Valley Basin; 1978 Chino Basin; 1979 Upper Los Angeles River Area; 1980 Scott River System; 1985 Puente; 1996 Santa Paula Basin, and 1998 Mojave Basin. *See* Ronald

Adjudication of all four basins in the San Gabriel watershed illustrates how the process of arriving at effective management varies. (1) The Raymond Basin is governed by adjudication from the famous *San Fernando* case discussed *supra*, Part I.D.1. Assigned pumping rights limit the amount of extraction to safe yield. However, the maximum annual extraction figure was adjusted once because the original estimate of safe yield was too low.[103] A board serves as the watermaster to monitor pumping and the basin's condition. Water producers bear the costs of administering this system.[104] (2) Initially, a water district tried to manage the West Basin without first adjudicating individuals' extraction rights.[105] When that failed, water users sought to clarify their rights via adjudication.[106] Now a California Department of Resources field office serves as the basin watermaster and assures that the West Basin is artificially replenished[107] because the rights assigned exceed the natural safe yield. However, pumpers pay taxes to cover these services.[108] (3) The Central Basin was also adjudicated after a water district could not solve overdraft problems. The Central Basin is currently managed and replenished much like the West Basin.[109] (4) Similarly, a water district was first created for the Main San Gabriel Basin, and eventually rights were adjudicated.[110] The basin's safe yield is set each year and each party is entitled to extract a share of the safe yield. Overpumping is taxed and that revenue is used to purchase water to replenish the basin.[111]

Part II

A. Why Adjudication?

Overdraft and depletion can be prevented by controlling extraction from the groundwater basin. But how can extraction be checked when it is unclear who has a right to withdraw water? The current system of groundwater law is

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Kaiser, *Deep Trouble: Options for Managing The Hidden Threat of Aquifer Depletion in Texas*, 32 TEX. TECH L. REV. 249, 280 n.159 (2001). The Mojave Basin is not on this list since appealing groundwater users are not bound by the stipulated judgment of the lower court.

103. William Blomquist, *Institutions for Managing Groundwater Basins in Southern California*, WATER QUANTITY/QUALITY MANAGEMENT AND CONFLICT RESOLUTION 43, 46 (Ariel Dinar and Edna Tusak Loehman eds., Praeger Publishers 1995).

104. *Id.*

105. *Id.*

106. *Id.* The California Court of Appeals affirmed the Superior Court of Los Angeles County's judgment. California Water Service Co. v. Edward Sidebotham & Son, Inc., 224 Cal. App. 2d 715 (1964).

107. Artificial replenishment entails importing surface water to spreading basins to percolate into the aquifer beneath.

108. Blomquist, *supra* note 103, at 46-47.

109. *Id.* at 47.

110. *Id.* at 48.

111. *Id.*

fraught with uncertainty.[112] The California Supreme Court warned that uncertainty "inhibits long range planning and investment for the development and use of waters . . .."[113] The California legislature declared that "the efficient use of water requires certainty in the definition of property rights to the use of water."[114] As one author noted, "[c]urrently, groundwater users have very uncertain ideas of what their respective rights are if the basin has not been adjudicated. The state of the law prevents fulfillment of the constitutional requirement that water be put to reasonable and beneficial use."[115]

For a number of reasons, it is imperative that adjudication of user rights be the first major groundwater law reform. First, the past sixty years of institutional experimentation in California demonstrate that adjudication is the necessary first step toward groundwater management. Only the rights-adjudicated basins in California are effectively managed. Second, groundwater is a commons problem that can only be solved by a private entitlement system. Third, public-private partnerships for conjunctive use and private markets in water rights are unlikely to be sustainable practices until groundwater ownership is clearly defined.

The fact that all sustainable management schemes in California today came about only after rights to use the groundwater were adjudicated suggests that adjudication is the imperative first step to accomplishing a long-term management scheme. Although the Orange County Water District ("OCWD") is often cited as an institutional solution to overdraft without adjudication,[116] because OCWD's management practices are not sustainable, it is not a model for developing a management structure. Orange County created a water district in 1933[117] that required every extractor to register with the OCWD.[118] The district then began monitoring all pumping and imposing a tax on withdrawals to fund artificial replenishment. There is no set pumping limit for users.[119] The OCWD

112. Garner, Ouellette, and Sharff, *supra* note 93, at 1028.

113. In re Waters of Long Valley Creek Stream System, 25 Cal. 3d 339, 355 (1979).

114. CAL. WATER CODE § 1011.5(a) (Deering 2001).

115. Michael P. Mallery, *Groundwater: A Call for a Comprehensive Management Program*, 14 PAC. L.J. 1279, 1290 (1983).

116. Susan M. Trager, *Emerging Forums for Groundwater Dispute Resolution in California: A Glimpse at the Second Generation of Groundwater Issues and How Agencies Work Towards Problem Resolution*, 20 PAC. L.J. 31, 63-64 (1988); ASHLEY & SMITH, *supra* note 3, at 44.

117. CAL. UNCOD. WATER ACTS, ACT 5683 (1933 Cal. Stat. 924). Although it was originally created in 1933, the district was substantially altered by an amendment in 1953 that authorized the OCWD to operate a replenishment program and impose pumping taxes within its jurisdiction. 1953 Cal. Stat. 770.

118. *Id.* at § 24.

119. Two commentators have pointed out that the OCWD approach ignores pre-existing priorities, thereby eliminating any advantage of having a pre-existing right in the basin groundwater. Nonetheless, the court dismissed all possible constitutional claims resulting from this deprivation in *Orange County Water District v. Fransworth*, 138 Cal. App. 2d 518 (1956), wherein it

prevents overdrafting by periodically measuring total extraction and artificially replenishing the basin to compensate for that loss. This system is not a sustainable method of preventing overdraft since it relies entirely on artificial recharge by imported surface water from the Colorado River and the Northern California State Project.[120] The OCWD arrangement is also flawed because, absent defined and transferable pumping rights, users have no incentive to move from lesser to higher valued uses.[121]

Groundwater depletion is a "tragedy of the commons." "Groundwater is a fugitive resource that is valuable only when it is captured; and we can expect groundwater basins to be overexploited, like buffalo or whales."[122] Rational pumpers using the resource believe that continuing to withdraw groundwater is in their best interest, even when extraction exceeds natural basin replenishment (thereby resulting in long-term overdraft and all of its consequences). Removing an additional unit of water is perceived as a greater benefit than the individual cost resulting from a slightly lowered water table.[123] "Therein is the tragedy. Each man is locked into a system that compels him to increase his [use] . . . without limit — in a world that is limited."[124]

A private property system can overcome the tragedy of the groundwater commons because it can internalize the externalities, both positive and negative, of extracting groundwater.[125] On the most fundamental level, water users will not be able to extract groundwater that someone else owns.[126] In addition, "[w]hen the effects of resource use

upheld the OCWD management method. *See* George G. Grover & John F. Mann, Jr., Acton v. Blundell *Revisisted: "Property" in California Groundwater*, 18 W. ST. U. L. REV. 589, 596 (1991).

120. *See* Paula K. Smith, *Coercion and Groundwater Management: Three Case Studies and a "Market" Approach*, 16 ENVTL. L. 797, 833 (1986).

121. WILLIAM BLOMQUIST, DIVIDING THE WATERS 270 (ICS Press 1992). *See also* Blomquist, *supra* note 103, at 57 (the author argues that making allocations specific and transferable allows for smooth adjustments in water use).

122. Anderson, *supra* note 42, at 101.

123. Mallery, *supra* note 115, at 1285; Barton H. Thompson, Jr., *Tragically Difficult: The Obstacles to Governing the Commons*, 30 ENVTL. L. 241, 250 (2000) ("Unfortunately, groundwater is ... a natural commons. Absent legal constraints, each user has an incentive to pump as much as he or she needs, even when the cumulative result is a rapid depletion or overdrafting of the groundwater aquifer.").

124. Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243, 1244 (1968).

125. Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 348 (1967) ("A primary function of property rights is that of guiding incentives to achieve a greater internalization of externalities."); Anderson, *supra* note 42, at 110 ("As the scarcity of surface water and groundwater increases, privatizing the commons offers the best hope of getting the highest value from these resources.").

126. SCHILLER & FOWLER, *supra* note 46, at 36.

are fairly localized, private property better aligns each owner's interests with the efficient level of use because each owner faces the full costs of overconsumption."[127]

But to create a private property system in groundwater, "the sovereign needs identifiable units of property, just as the holders of those units need sovereign activity, if renewable resources such as groundwater are to continue their renewability."[128] The OCWD management strategy mentioned above, which was not premised on adjudication of rights, has not resolved the "tragedy of the commons" because users do not have ownership shares that would give them incentives to keep the basin's water supply sustainable. "[E]ven if each pumper pays her pro rata share of the increased costs, each continues to have an incentive to go on pumping. The solution is therefore not just to impose the increased costs of pumping on all pumpers pro rata, but to reduce total pumping."[129] In order to enforce pro rata reductions when overdraft is occurring, California's groundwater law must clarify all claims of usufructuary rights to the groundwater.[130]

Following the "reasonable and beneficial use" mandate of the California Constitution,[131] only rights to *proportionate* use should be determined by adjudication. Allocating *absolute* rights will only exacerbate the groundwater commons tragedy. According to one author:

> Property rights can help solve the tragedy of the commons when the rights result in the effective internalization of the cost of excessive harvesting, but property rights turn harmful when they reinforce a sense of entitlement to an unlimited harvest . . . [T]hey . . . can . . . cause resource users, as a matter of fairness, to reject out of hand even the suggestion that they should reduce their current usage . . . Moreover, property rights may focus resource users on their individual interests rather than on total societal well being, undermining social norms of cooperation and reinforcing the very dichotomy between individual and social welfare that underlies the tragedy of the commons.[132]

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127. Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621, 678 (1998).

128. Earl F. Murphy, *Some Legal Solutions for Contemporary Problems Concerning Groundwater and Aquifers*, 4 J. MIN. L. & POL'Y 49, 111 (1988).

129. Smith, *supra* note 120, at 810-11. Smith points out other problems with the system, namely that users are not paying the entire replacement cost since the surface water obtained for replenishment is subsidized by the state and federal governments and many users are exempt or paying discounted replenishment and equity fees. *Id.* at 841.

130. *Id.* at 873-74 ("some kind of allocation is required, regardless of what the other groundwater management scheme components ... may be ...").

131. CAL. CONST. art X, § 2.

132. Thompson, *supra* note 123, at 257.

There should be no misunderstanding about the proportionate nature of rights when they are adjudicated.

In addition, ascertaining proportionate ownership in each basin is a logical prerequisite to commencing markets in water rights and allowing private individuals to make conjunctive use arrangements. Groundwater experts have long insisted that groundwater banking not begin until rights have been clarified.[133] But these pleas have been in vain, as at least twelve conjunctive use projects are already operating in California.[134] The California Department of Water Resources counts on availability of these arrangements to meet the state's demand for water.[135]

Conjunctive use in non-adjudicated and non-monitored basins is risky because the uncertainty in property rights presents a loophole for wrongdoers to act and evade responsibility. For example, who will be liable if water quality deteriorates as a result of a conjunctive use arrangement?[136] Who will be liable if too much water is stored and flooding results? How can non-contracting parties be sure that adequate room will be reserved for naturally recharging water to percolate into the basin for those who claim rights in percolating basin water but not in the artificially imported water?[137] How will contracting parties prevent non-contracting parties from using water that "belongs" to the contracting parties?[138] Unfortunately, those desiring to initiate conjunctive use arrangements are unable to incorporate all users into the agreement to avoid these potential disputes because user rights have not been established.

In the past five years, government agents and a private company, Cadiz, have conducted numerous studies regarding one such proposed conjunctive use and water marketing arrangement involving groundwater beneath the Mojave Desert.[139] The Mojave Desert overlies nine groundwater basins[140] containing 20 million acre-feet of

133. James H. Krieger and Havey O. Banks, *Ground Water Basin Management*, 50 CAL. L. REV. 56, 69 (1962) ("The use of groundwater storage for imported water cannot be completely successful unless the natural local water supply has been fully adjudicated so that extractions can be controlled and the basin fully managed.").

134. EDELLA SCHLAGER & WILLIAM BLOMQUIST, 1998 PROGRESS REPORT: A COMPARATIVE INSTITUTIONAL ANALYSIS OF CONJUNCTIVE MANAGEMENT PRACTICES AMONG THREE SOUTHWESTERN STATES (Environmental Protection Agency, National Center for Environmental Research), *at* http://es.epa.gov/ncer/progress/grants/95/water/schlager 98.html (Dec. 19, 2000).

135. The Department notes that "[w]ater users in the Central Valley, Bay Area, and Southern California having access to major regional conveyance facilities have . . . opportunities to rely on water marketing arrangements and conjunctive use options . . ." CALIFORNIA DEPARTMENT OF WATER RESOURCES, *supra* note 6, at ES5-11.

136. Foley-Gannon, *supra* note 27, at 298.

137. *Id.*

138. *Id.*

139. See *infra* note 161.

140. Upper, Middle and Lower Mojave River, Harper, Coyote, Caves, Cronise Valley, Soda, and Silver Lake basins.

water within a 1300 square mile watershed.[141] Because the annual recharge rate is low, experts believe that the immense quantity of water now underlying the desert percolated over thousands of years.[142] In 1990 in the northwestern corner of the watershed, the City of Barstow sued upstream pumpers, alleging that they overdrafted the groundwater basin.[143] The Mojave Water Agency cross-complained for an adjudication of water rights in the watershed.[144] Non-stipulating parties appealed the physical solution to the California Supreme Court, which resulted in the *City of Barstow v. Mojave Water Agency* decision described *supra*, Part I.D.1. Users who did not stipulate to the judgment are not bound to limit their extractions to comport with the safe yield equation calculated by stipulating parties.[145] Thus, the future of groundwater in the northwestern corner remains at risk.

East of the groundwater basins at issue in *City of Barstow v. Mojave Water Agency*, the groundwater beneath the Cadiz and Fenner Valleys is also at risk. Here, too, groundwater rights have not been adjudicated. Nonetheless, Cadiz would like to sell and store water in the basin underlying its 27,000 acres in a 50 year contract with the MWD.[146] The MWD has considered contracting with Cadiz to jointly construct a 35-mile pipeline from a 390 acre man-made basin on the Cadiz property to the MWD's Colorado River Aqueduct.[147] Under the terms of the proposed agreement, the MWD would be bound to buy at least 30,000 acre-feet of native groundwater each year for the first twenty-five years of the contract, and could elect to purchase an additional 30,000 acre-feet per year during that period.[148] In addition, the MWD could pump up to 150,000 acre-feet per year of Colorado River water into the aquifer during wet years, and withdraw that water during dry years.[149]

Five federal wilderness areas and Joshua Tree National Park surround Cadiz's property. Under the implied reservation doctrine, the United States has the right to

141. METROPOLITAN WATER DISTRICT, ABOUT THE PROPOSED CADIZ PROGRAM, *at* http://mwd.dst.ca.us/mwdh2o.data/site%20trash/aboutcadiz01.html (last visited Nov. 4, 2002).

142. Blomquist, *supra* note 121, at 41.

143. Garner, Ouellette, and Sharff, *supra* note 96, at 1045.

144. *Id.*

145. City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224, 1253, 1256 (2000).

146. CADIZ, INC., THE CADIZ GROUNDWATER STORAGE AND DRY-YEAR SUPPLY PROGRAM, *at* http://www.cadizinc.com/c/pdf/Q&A%20page1.pdf.

147. METROPOLITAN WATER DISTRICT, ABOUT THE PROPOSED CADIZ PROGRAM, *supra* note 141; *see also* METROPOLITAN WATER DISTRICT & BUREAU OF LAND MANAGEMENT, FINAL ENVIRONMENTAL IMPACT REPORT/ ENVIRONMENTAL IMPACT STATEMENT: CADIZ GROUNDWATER STORAGE AND DRY-YEAR SUPPLY PROGRAM. SAN BERNARDINO COUNTY, CALIFORNIA *at* http://www.mwd.dst.ca.us/mwdh2o/pagesn ews/cadiznet/index.htm.

148. SUMMARY OF METROPOLITAN/CADIZ ECONOMIC TERMS (March 6, 2001) *available at* http://www.mwd.dst.ca.us/mwdh2o/pdf/news/Cadizsummary01.PDF.

149. METROPOLITAN WATER DISTRICT, *supra* note 141.

water that originates on or beneath reserved parkland[150] as needed to fulfill the purpose of reserving the land.[151] It follows that the federal government may claim rights to the groundwater beneath Joshua Tree National Park as needed to sustain the park in its current condition, assuming the land was reserved for purposes of conserving the natural ecosystem. For non-reserved federal land, which includes the five wilderness areas, the federal government is likely to defer to state law to determine how its water rights will be determined.[152] Unfortunately, California's common law system of ambiguous usufructory rights does not protect the public interest in maintaining the water table at its current level, thereby assuring stability of the desert ecosystem. Conserving the desert ecosystem requires adjudication of public and private rights to water use to guarantee that Cadiz' project will not extract water needed to sustain the desert flora and fauna.[153]

At least for the short-term, the MWD has laid concerns about the Mojave Desert ecosystem to rest with a narrowly approved board vote on October 8, 2002 to cancel the Cadiz project.[154] After the parties involved spent nearly five years conducting environmental studies, the MWD voted in the eleventh hour to forego the binding contract and the Cadiz Groundwater Storage and Dry-Year Supply Program.[155] The project is allegedly "the only California-based storage and supply project to receive all of its federal environmental approvals."[156] However, the MWD board members cited various reasons for rejecting the project, including (1) concern that environmental questions have not yet been

150. W. Douglas Kari, Note, *Groundwater Rights on Public Land in California*, 35 HASTINGS L.J. 1007, 1010 (1984). ("When the federal government reserves land [e.g. national parks] ... it often expressly or impliedly reserves the water rights necessary to carry out the purposes of the land reservation.").

151. ASHLEY & SMITH, *supra* note 3, at 18.

152. Kari, *supra* note 150, at 1022. California recognizes appropriation rights to groundwater beneath public land. *Id.* at 1027.

153. SCHILLER & FOWLER, *supra* note 46, at 33 (suggesting that when water is needed for environmental protection, title to the water should be given to the public agency with that responsibility).

154. The motion to cancel the project required a 50% vote of support to pass, and the motion garnered 50.25% of the MWD board's weighted votes. Michael A. Hiltzik, MWD *Cancels Desert Storage Project*, L.A. TIMES, October 9, 2002, at B6.

155. *Resources: The Stakes are High—Financially and Politically—For the Santa Monica Company and its Proposed Partner, the Metropolitan Water District*, L.A. TIMES, May 19, 2002, at B3.

156. *Metropolitan Water District Votes on Cadiz Program; Board Rejects Terms and Conditions of Federal Right-of-Way Grant*, BUS. WIRE, October 8, 2002. The U.S. Fish and Wildlife Service determined that the project will not hurt flora and fauna; the U.S. Environmental Protection Agency found that it complies with the Clean Air Act and will not adversely impact the area's air quality; and the Department of Interior granted a Record of Decision in August, 2002, for a right-of-way through federal wilderness land after the Bureau of Land Management worked with the U.S. Geological Survey and National Park Service to affirm the program's viability. *Cadiz Program Receives Final Federal Environmental Approval; U.S. Department of the Interior Issues Record of Decision*, BUS. WIRE, August 29, 2002.

answered, (2) doubt about Cadiz' financial stability as a business partner, and (3) uncertainty over the availability of excess Colorado River water in coming years necessary to make the conjunctive use project worthwhile.[157] The MWD has yet to certify the Final Environmental Impact Report/Environmental Impact Statement and sign final contracts with Cadiz.[158]

However, the Cadiz project may not be entirely derelict, as Cadiz has stated that it intends to continue pursuing the project and believes that the MWD is bound to move forward.[159] The MWD's decision to forestall a conjunctive use project in Mojave gives policymakers an opportunity to protect the desert ecosystem and assure responsible groundwater harvesting by adjudicating public and private rights to water use before arranging for widespread water extraction.

B. Why Opt for a New System of Adjudication Imposed at the State Level?

In 1978, the Governor's Commission, recognizing that California's groundwater is inadequately protected by law,[160] recommended a new system of adjudication imposed at the state level.[161] But narrow interest groups stymied policy-makers and groundwater reform efforts drowned. In the twenty-five years since, the groundwater situation has not improved and the state is still better positioned than local governments, in terms of resources and authority, to clarify rights in groundwater use.[162] Part II.A, *supra*, demonstrated that clarifying property rights in groundwater via adjudication is imperative. This section illustrates why a new system of adjudication is necessary and why it must be imposed systematically at the state level.

The current adjudicatory system has numerous flaws. First and foremost, individuals have no incentive to sue until a basin is overdrafted.[163] The common law correlative rights doctrine[164] is partly to blame because the law does not restrict the

157. Hiltzik, *supra* note 154.

158. *Cadiz Program Receives Final Federal Environmental Approval*, *supra* note 156.

159. *Metropolitan Water District Votes on Cadiz Program; Board Rejects Terms and Conditions of Federal Right-of-Way Grant*, *supra* note 156.

160. CALIFORNIA GOVERNOR'S COMM'N TO REVIEW CALIFORNIA WATER RIGHTS LAW, FINAL REPORT 136 (1978).

161. The Commission recommended dividing the state into management areas for individual governance by a local groundwater management authority who may seek adjudication of rights if management is not otherwise adequate. *Id.* at 168-69; Deborah A. de Lambert, *District Management for California's Groundwater*, 11 ECOLOGY L.Q. 373, 394 (1984); Zachary A. Smith, *Rewriting California Groundwater Law: Past Attempts and Prerequisites to Reform*, 20 CAL. W. L. REV. 223, 240-41 (1984); Mallery, *supra* note 115, at 1298.

162. Garner, Ouellette, and Sharff, *supra* note 93, at 1050.

163. Foley-Gannon, *supra* note 27, at 289; De Lambert, *supra* note 161, at 389.

164. For an explanation of the correlative rights doctrine, *see supra* Part I.D.1.

overlying owner's share until the basin is overdrafted. So groundwater "law" does not check water use until damage to the basin has already occurred.[165] Second, litigants have trouble ascertaining all the proper parties through the traditional judicial process.[166] Third, parties have little incentive to reach stipulated judgments since those who do not agree are not bound to the physical solution and can litigate their claims.[167] Fourth, adjudication is lengthy and expensive, and appeals often delay trial courts' stipulated judgments from becoming effective for many years.[168] Fifth, judges impose physical solutions at one point in time, but may not engineer them to account for changes in hydrologic conditions and human impact on water sources.[169] Sixth, since a court cannot address an issue until a party raises it, the standard judicial system is not the ideal forum for effecting reform.[170]

Nonetheless, adjudication affords groundwater users many benefits. First, adjudication makes users' ownership interests certain and definite. Second, when an extractor quits pumping, he can sell or lease his right, instead of just forfeiting it.[171] Third, judges can tailor remedies to the unique attributes of the basins and their users.[172] One scholar points out that:

> [It] is important to recognize . . .that the difficulties encountered by groundwater users in any given location will depend in large measure on the properties of the basin on which they rely. . .. The attorneys recognize and write about how much the physical characteristics of groundwater basins differ, and how much those specific differences matter, while engineers often

165. Mallery, *supra* note 115, at 1284.

166. De Lambert, *supra* note 161, at 390.

167. The California Supreme Court created this negative incentive when the panel held in *City of Barstow* that parties' rights will not be affected (unless mutual prescription has been established) if they refuse to sign the stipulated judgment. City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224, 1253, 1256 (2000).

168. De Lambert, *supra* note 161, at 389; Foley-Gannon, *supra* note 27, at 289. For example, the Central Basin (under San Gabriel River) adjudication cost $585k (in 1965 dollars) and lasted six and ½ years. Blomquist, *supra* note 121, at 141. Adjudication of the West Basin underlying western Los Angeles dragged on for 16 years. *Id.* at 106. The *Tehachapi-Cummings* suit took nine years. De Lambert, *supra* note 161, at 389 n.106. Adjudicating the basin at issue in *San Fernando* took twenty years. *Id.*

169. Trager, *supra* note 116, at 61.

170. Sometimes parties assume an issue has been resolved when it has not even been addressed. For example, apparently no one was aware that public entities had immunity from mutual prescription based on an amendment to Civil Code § 1007 until the issue came before the California Supreme Court in *San Fernando*. Blomquist, *supra* note 121, at 216.

171. Blomquist, *supra* note 103, at 55.

172. Foley-Gannon, *supra* note 27, at 289.

observe how much the legal, economic, and political circumstances of groundwater basins differ, and how much these specific differences matter.[173]

The state has authority and resources to impose effective adjudication, whereas local entities do not.[174] The state legislature has long reserved the right to regulate groundwater to benefit and protect the public.[175] Because groundwater moves within a basin, groundwater management can only be effective when employed across the entire basin. In most instances, local entities cannot accomplish this task because jurisdictional boundaries do not comport with basin boundaries. The state is also better situated to provide funding and enforce regulations,[176] as the costs of managing groundwater basins can be spread across all water consumers in the state.

Part III

A. The Proposal

The state legislature must pass groundwater reform legislation. The new legislation, the Groundwater Rights Clarification Act ("GRCA"), should go beyond the 1978 Governor's Commission recommendations, which offered adjudication as an *option* for local management authorities. GRCA should create an adjudicatory process to determine the use rights to all groundwater in California, exempting only the sixteen basins already adjudicated.

The Groundwater Rights Clarification Act should contain the following elements. First, the state will be divided into management areas that follow the boundaries of natural basins. Second, each basin will have its own management authority (the "Authority"). Third, all basin extractors will be required to register with the Authority.[177] Fourth, the Authority will meter all extractions and keep pumping logs of the entire basin. The Authority will ascertain the basin's safe yield (if this is not already known) and assess whether the basin is overdrafted.[178] Fifth, the Authority will file a suit to adjudicate groundwater user rights in its jurisdiction. Judges with special expertise in groundwater

173. Blomquist, *supra* note 121, at 24, 25.

174. Garner, Ouellette, and Sharff, *supra* note 93, at 1050.

175. CAL. WATER CODE §§ 104, 105 (Deering 2001); *see also* CAL. WATER CODE § 12922 (Deering 2001) (declaring the public interest in protecting groundwater basins from "overdraft, depletion, sea water intrusion or degraded water quality.").

176. Garner, Ouellette, and Sharff, *supra* note 93, at 1050.

177. The Recordation Act already requires this of all users in four Southern California counties. CAL. WATER CODE § 4999- 5008 (Deering 2001).

178. The Governor's Advisory Drought Planning Panel observes that, "[t]he lack of availability of groundwater data in various areas of the State ... [is a] significant impediment to fostering cooperative local and regional solutions to water management needs ... the availability of groundwater hydrologic data in California lags behind that of surface water data, in part because of the inherent nature of the resource and to the absence of a statewide system of permitting and reporting groundwater extractions." GOVERNOR'S ADVISORY DROUGHT PLANNING PANEL, *supra* note 11, at 4-9.

law will adjudicate the rights of each basin, taking into account claimed priorities and prior use.[179] The equitable apportionment test mentioned in footnote 61 of the *San Fernando* case, quoted *supra* Part II.D.1, lists factors the judges should consider.[180] GRCA will dictate how to determine necessary parties, select the judges, limit venue, fulfill requirements of notice, set parameters of discovery, and pre-ordain the use and effect of the stipulated judgments.[181]

GRCA will clarify the rights of all current and potential users.[182] Civil Code § 1007 must be amended to leave no doubt that municipalities' water claims can (and will) be incorporated into the basin adjudication.[183] Adjudication will assign shares for the "right to extract" to each pumper. These rights will be expressed as a percentage of total basin extraction. The right will be identified in relation to the rights of others, and:

> [A]llocation should be limited to the natural and artificial recharge amount but should include enough flexibility in the same time span selected to allow pumping more than annual recharge in some dry years and to allow storage for replenishment in wet years . . . . [S]ome reduction in the allocation may be required on a pro rata basis in order to restrict withdrawal to safe yield. These reductions should be set out in terms of reducing a percentage of accumulated overdraft over a period in which withdrawal and recharge can be balanced and should leave the aquifer with adequate storage room. This

179. Adjudicating rights based on prior use runs the risk that that users who know this in advance will "race to the pumphouse." Blomquist, *supra* note 121, at 353; Garner, Ouellette, and Sharff, *supra* note 93, at 1026. It is unclear how this phenomenon can be avoided entirely. Since the judges will consider other factors besides prior use, perhaps extractors will doubt the efficacy of racing to the pumphouse.

180. However, the judges must consider common law overlying rights and prescriptive priorities as well. In *City of Barstow v. Mojave Water Agency* the California Supreme Court stated that footnote 61 is not "precedent for wholly disregarding the priorities of existing water rights in favor of equitable apportionment . . . [W]e have never endorsed a pure equitable apportionment that completely disregards owners' existing legal rights." 23 Cal. 4th 1224, 1247-1248 (2000).

181. The Governor's Commission proposed these streamlining procedures in 1978. *See* CALIFORNIA GOVERNOR'S COMM'N TO REVIEW CALIFORNIA WATER RIGHTS LAW, *supra* note 160; De Lambert, *supra* note 161, at 395-396.

182. Because the common law does not require overlying owners to extract groundwater to maintain their rights to it, 62 Cal. Jur. 3d § 398 (1981), the Authorities will name all overlying landowners as parties and the judges will determine overlying owners' proportion of current and potential use.

183. To work with the existing common law framework and bring all extractors to the table, arguably mutual prescription must be applicable to municipal groundwater extractors. Because the *San Fernando* court interpreted Civil Code § 1007 to immunize municipal extractors from prescriptive claims, Civil Code § 1007 should be amended to clarify that prescriptive rights can be gained against municipal extractors. *See supra*, Part I.D.1 for a discussion of the *San Fernando* Court's modification of the mutual prescription doctrine.

should be made explicit in the original statute to reduce uncertainty about how reductions will be made.[184]

After usufructuary rights are adjudicated, the basin authority may assess pumping taxes, stipulate proportionate reductions when necessary to prevent overdrafting, and facilitate conjunctive use projects. Since the statute creates defined yet flexible water allocations, the Authority can choose management strategies that are appropriate to the particular characteristics of its basin.[185]

Local efforts that contradict adjudication will be preempted by the state statute. There are currently a number of local groundwater management programs in the state. "[I]n California Water Code sections 1220 and 10753, the Legislature has authorized certain counties to enact groundwater management plans. Section 1220 expressly and exclusively applies to counties. Section 10753 applies only to counties that meet its specific requirements. In combination, however, these two statutes greatly expand the express power of counties to control groundwater exports."[186] But the California Constitution, Article XI, Section 7 only allows a city or county to make and enforce local ordinances "not in conflict with general laws."[187] Therefore, locally devised attempts to control groundwater will be ineffective to the extent they interfere with the state-mandated adjudication.

B. Why This Approach Can Work

This proposal does not constitute a massive upheaval of current rights in property, and it will not result in the taking of private property.[188] Rights created by the common law system are not extinguished by this arrangement. Following the California Supreme Court's holding in *City of Barstow*, priorities will not be ignored, but other considerations will also be relevant. This proposal is pragmatic, recognizing that adjudicating rights based on priority alone is not feasible.[189] The state-imposed transition of surface water rights to a permitting scheme from a riparian/appropriation scheme demonstrates that it is possible to re-characterize rights of water use without actually taking the rights to use water.[190]

Furthermore, learning from the lessons of the past, the proposal can be pitched to garner support, or at least avoid opposition, of the farming lobby that defeated the

184. Smith, *supra* note 161, at 875.

185. Blomquist, *supra* note 103, at 53-54.

186. Weber, *supra* note 62, at 380.

187. CAL. CONST. Art XI § 7.

188. CAL. CONST. Art 1 § 19 (West 2002) ("Private property may be taken or damaged for public use only when just compensation . . . has first been paid . . .").

189. City of Barstow v. Mojave Water Agency, 23 Cal. 4th 1224, 1235 (2000) ("The [trial] court . . . concluded that allocating water based on asserted legal priorities would be 'extremely difficult, if not impossible.'").

190. *See, e.g.*, Mallery, *supra* note 115, at 1304 n.295.

groundwater rights reform efforts of 1978-1981.[191] A number of scholars have attempted to ascertain the impetus of the lobby, comprised of the California Cattlemen's Association, California Chamber of Commerce, California Farm Bureau and the Association of California Water Agencies (collectively referred to herein as the "farming lobby").[192] Some believe that the farming lobby was motivated by a fear of losing local control to a centralized administration and/or of losing individual rights (present and future) to extract groundwater.[193] Various members of the farming lobby were optimistic that surface waters could offset overdrafts, negating the need for groundwater management reform.[194] One study revealed that in California and other states that have proposed groundwater reform bills, some bills passed and others were denied, not because of opposition/support for central administration per se, but because of sentiment about the particular administration in power at the time these bills were proposed.[195]

The farming lobby must be convinced that the state will not deny them rights or control, but give them more rights and control. The state will not impose particular management strategies, but only require clarification of usufructuary rights. The system will better serve current rights claimants because it will minimize future litigation by making the law more certain and rights more specific. Claimants will be guaranteed rights now so that others cannot gain prescriptive rights against them later. In addition, authorities of adjudicated basins may import surface water to maintain the water table and prevent overdrafting, keeping the availability of water at the status quo.[196]

Part IV

We know too much about the science of groundwater, the effects of overdrafting and the projected water demands of our booming population to be satisfied with a system that ignores these facts and promises only uncertainty. Instead of following laws premised on reality, we have a system resting on the fiction that groundwater is an unlimited commons. It is "perhaps best summarized as the right to pump as much

191. Smith, *supra* note 161, at 242, 246-50 (suggesting that agricultural groups succeeded in opposing legislation and defeated the environmental lobby because of political campaign contributions, membership size, importance of farming interests to the state economy, and ability to finance television campaigns).

192. Zachary A. Smith, *Centralized Decisionmaking in the Administration of Groundwater Rights: The Experience of Arizona, California and New Mexico and Suggestions for the Future*, 24 NAT. RESOURCES J. 641, 685 (1984); Smith, *supra* note 161, at 247; ASHLEY & SMITH, *supra* note 3, at 49-52.

193. De Lambert, *supra* note 161, at 400; ASHLEY & SMITH, *supra* note 3, at 50.

194. ASHLEY & SMITH, *supra* note 3, at 50.

195. Smith, *supra* note 192, at 686-687.

196. This would be more sustainable that the OCSD importation arrangement, critiqued *supra* Part II.A, because users would pay the true cost of importing surface water and water transfers, made possible because only discreet rights holders will be entitled to extract water, will likely result in higher-valued uses of the water.

water as possible until one is sued."[197] California groundwater law reform is imperative because the current system endorses an unsustainable use of limited resources statewide. The environmental community and academic circles know this already, but to pass state legislation, residents of the state must know this too. We must convince groundwater extractors and groundwater consumers that rights adjudication is in their best interests now.

197. Garner, Ouellette, and Sharff, *supra* note 93, at 1022.